IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A method of monitoring a processing system for processing a substrate during the course of semiconductor manufacturing comprising:

acquiring data from said processing system for a plurality of observations, said data comprising a plurality of data variables;

determining one or more principal components of said data for said plurality of observations using principal components analysis;

~~weighting at least~~ applying a first weighting factor to a first one of said plurality of data variables and a second weighting factor to a second one of said plurality of data variables during said principal components analysis;

acquiring additional data from said processing system; determining at least one statistical quantity from one or more scores calculated from a projection of said additional data onto said one or more principal components;

determining a control limit for said at least one statistical quantity; and comparing said at least one statistical quantity to said control limit,

wherein the first weighting factor is based on a first relative importance of the first one of said plurality of data variables, the second weighting factor is based on a second relative importance of the second one of said plurality of data variables, and the first relative importance is different from the second relative importance.

Claim 2 (Original): The method as recited in claim 1, wherein a process fault has occurred when said at least one statistical quantity exceeds said control limit.

2

Claim 3 (Currently Amended): The method as recited in claim 1, wherein said data comprises at least one of a capacitor position, a forward radio frequency (RF) power, a reflected RF power, a voltage, a current, a phase, an impedance, a RF peak-to-peak voltage, a RF self-induced direct current bias, a chamber pressure, a gas flow rate, a temperature, a backside gas pressure, a backside gas flow rate, an electrostatic clamp voltage, an electrostatic clamp current, a focus ring thickness, RF hours, a process step duration, focus ring RF hours, an optical emission spectrum, and RF harmonics.

Claim 4 (Original): The method as recited in claim 1, wherein said data comprises at least one of an instantaneous value, a time average, a standard deviation, a third moment, a fourth moment, and a variance.

Claim 5 (Original): The method as recited in claim 1, wherein said statistical quantity comprises at least one of a distance to model parameter (DModX), and a Hotelling T^2 parameter.

Claim 6 (Original): The method as recited in claim 1, wherein said determining at least one statistical quantity further comprises a back-projection of said one or more scores with said one or more principal components to determine one or more residual errors.

Claim 7 (Original): The method as recited in claim 6, wherein said back-projection of said one or more scores with said one or more principal components comprises matrix multiplication.

Claim 8 (Original): The method as recited in claim 1, wherein said projection of said additional data onto said one or more principal components comprises matrix multiplication.

Claim 9 (Canceled).

Claim 10 (Currently Amended): The method as recited in claim [[9]] 1, wherein at least one of said first weighting factor and said second weighting factor is determined from at least one of a data standard deviation (S_o), a desired standard deviation of said data variable (S_d), a relative importance of said variable (f), and a data resolution (R).

Claim 11 (Original): The method as recited in claim 1, wherein said weighting at least one of said plurality of data variables comprises applying a group scaling method.

Claim 12 (Original): The method as recited in claim 1, further comprising:

accessing at least one of said data, said additional data, said at least one statistical quantity, and said control limit via at least one of an intranet, and an internet.

Claim 13 (Withdrawn): A processing system for processing a substrate during the course of semiconductor manufacturing comprising:

a process tool; and

a process performance monitoring system coupled to said process tool comprising a plurality of sensors coupled to said process tool, and a controller coupled to said plurality of sensors and said process tool,

wherein said controller comprises

means for acquiring data from said plurality of sensors for a plurality of observations, said data comprising a plurality of data variables;

means for determining one or more principal components of said data for said plurality of observations using principal components analysis;

means for weighting at least one of said plurality of data variables during said principal components analysis;

means for acquiring additional data from said plurality of sensors; means for determining at least one statistical quantity from one or more scores calculated from a projection of said additional data onto said one or more principal components;

means for determining a control limit for said at least one statistical quantity; and

means for comparing said at least one statistical quantity to said control limit.

Claim 14 (Withdrawn): The processing system as recited in claim 13, further comprising: means for accessing at least one of said data, said additional data, said at least one statistical quantity, and said control limit.

Claim 15 (Withdrawn): The processing system as recited in claim 14, wherein said means for accessing comprises at least one of an intranet, and an internet.

Claim 16 (Withdrawn): A processing performance monitoring system to monitor a processing system for processing a substrate during the course of semiconductor manufacturing comprising:

a plurality of sensors coupled to said processing system; and

a controller coupled to said plurality of sensors and said processing system, wherein said controller comprises

means for acquiring data from said plurality of sensors for a plurality of observations, said data comprising a plurality of data variables;

means for determining one or more principal components of said data for said plurality of observations using principal components analysis;

means for weighting at least one of said plurality of data variables during said principal components analysis;

means for acquiring additional data from said plurality of sensors;

means for determining at least one statistical quantity from one or more scores calculated from a projection of said additional data onto said one or more principal components;

means for determining a control limit for said at least one statistical quantity; and

means for comparing said at least one statistical quantity to said control limit.

Claim 17 (Withdrawn): The process performance monitoring system as recited in claim 16, further comprising: means for accessing at least one of said data, said additional data, said at least one statistical quantity, and said control limit.

Claim 18 (Withdrawn): The process performance monitoring system as recited in claim 17, wherein said means for accessing comprises at least one of an intranet, and an internet.